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THE ECONOMICS OF EDUCATION: A SURVEY*

BY
BARBARA WOODFILL

TECHNICAL REPORT NO. 12
APRIL, 1963

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by

Barbara Woodfill

Thirty-five million children are attending elementary and secondary schools, and another 4 million people are enrolled in over 2000 institutions of higher learning. A total of 25 percent of our population is engaged in the process of "being educated." The economics of this complex and its product has recently become a popular area of investigation. Almost as many approaches have been employed as the number of studies, and, not surprisingly, the conclusions reached are diverse. As Bowen [5] pointed out, this variety of directions could be regarded as proof of the inventiveness of economists, as indication of the difficulty of the problem, or as evidence that the best method of attack is simply not known.

In reviewing the literature I have separated the several studies into three major categories: investment, finance, and a miscellaneous group which contains manpower studies and decision processes. The inclusion of a study in the miscellaneous category does not indicate any lack of importance but rather the paucity of work on that aspect of education. A section has also been written in which some sources of statistical data are discussed.

The meaning of education varies among the studies; it may encompass formal education on the primary and secondary levels, higher education, vocational and on-the-job training,

or deal with only one or two of these divisions. I have indicated in each case the areas covered.

Investment

There have been several investigations of investment in education and they can be conveniently divided into two groups: (1) those concerned with education as related to growth; and (2) those emphasizing the direct returns of investment in education.

Growth studies encompass primary, secondary and higher education. Education contributes to economic growth via the creation of human capital, but for many years increases in productivity were ascribed solely to increases in physical capital accumulation. Statistical work, however, revealed that the amount of physical capital per worker only partially explained the increase in production. Fabricant [11] estimated that total physical output in the United States grew 3.5 percent per year between 1889 and 1957, but output per unit of capital and labor combined grew at 1.7 percent per year. Kendrick's [22] estimates yielded the same conclusions. Solow [38], by making explicit assumptions about the underlying production function, found that 90 percent of the increase in output per man-hour in the United States between 1915 and 1955 was unexplained by increases in physical capital inputs.

These studies utilize what might be termed a residual approach. Increases in productivity due to measurable inputs – usually capital and labor – are calculated and the residual is then attributed to the unspecified inputs – usually education and increased knowledge. Kendrick's study assigned 46 percent of the increase in total output to this residual. Recently, Edward Denison [9] attempted a more detailed description of the measurable inputs. He obtained a smaller residual for "advances in knowledge" than the others

by estimating that formal education explained 23 percent of our growth.

There are many drawbacks to this approach. The relation between physical capital inputs and the education and advancing knowledge component of the residual is not adequately considered, and the available indices of capital usually do not reflect improvements in the quality of capital. More generally, the heterogeneous nature of the residual makes it a weak measure of anything but lack of information.

A second method of measuring the relation between education and growth is a simple correlation analysis. Correlations of education and growth between countries and within a single country over time have been made. Svennilson [39] correlated enrollment ratios and GNP per capita for several countries and found a positive relationship. The problems of measurement in this case are especially acute (finding comparable GNP figures and comparable indices of educational activity), but even if these are solved satisfactorily there is still the problem of interpreting a positive correlation. It might indicate that expenditure on education raises GNP, or it could mean that as GNP rises more is spent on education.

T. S. Schultz [36] and Seymour Harris [18] have both made correlations between GNP and education within the U.S. Schultz, treating education as a consumer good, found that the income elasticity of demand for education was 3.5 over the period 1900 to 1956. Besides the obvious flaw of considering education solely a consumer good, the question of causation again makes it difficult to interpret this figure.

Measurement of direct returns to investment in education has been the aim of numerous studies. There is a dichotomy between returns to the individual and returns to society. If a rate of return is to be the basis of allocation of resources to education, it should be noted that a positive return to the individual is not necessarily of benefit to society. For example, higher education might lead to greater variation in income distribution [26]. Studies relating education to the

individual usually consider higher education only; an average educational level is assumed the attainment of which is of no extra value to the individual, relative to his fellow citizens. Education with respect to society includes all levels of formal schooling and, in some cases, technical and on-the-job training.

While economists have long been aware of the importance of education, it is only recently that attempts at quantifying the value of this education have been made. In 1935, J. R. Walsh [45] published an article in which he attempted to measure the returns to the individual of education leading to a professional career. He examined earning through life of men of various grades of education and computed a discounted value of the average man in each group. By estimating the costs of the levels of training and comparing them to the discounted value, he concluded that the value exceeded the costs. This was the first of many studies attempting to measure direct returns to the individual in terms of expected income. In 1949, Paul Glick and Henry Miller [15] estimated the lifetime incomes of persons with varying amounts of education based on mean income by age and education. They calculated that the lifetime income of the average male college graduate was $100,000 more than that of the average male who never went beyond high school. Renshaw [31] in a recent article claimed that the average rate of return to private investment in education is about 14 percent. A highly acclaimed study by Becker [1] which is still in progress shows that the mean lifetime income advantage (after taxes) of college graduates over high school graduates, using age-income data for 1950, gave a 10 percent return on average private costs of college attendance.

This analysis has been criticized on many grounds. First, as Houthakker [21] pointed out, estimates of income such as those of Glick and Miller are based on income before taxes, and, further, no attempt is made to discount future

incomes back to the time at which the decision to obtain the education was made. Second, there is the question whether income is an adequate measure of the returns to the individual. There are non-monetary gains such as status, opportunity to obtain more education, etc., which are considered by some to be a significant portion of returns to the individual [44]. Third, there is evidence that people with more ability have large incomes even when they don't have more education [7]. If this is accepted along with the fact that college graduates have higher average ability than high school graduates, there is substance to the argument that part of the value of a college education is the value of being more intelligent. Differences in income might also be partially explained by differences in background, connections, etc. Finally, even if expected income is accepted as a measure of gross returns from a college education, how are the costs to be measured? Not only direct costs (tuition, books) but indirect costs such as income foregone need to be ascertained. Schultz [33] estimated that college students had foregone $1300 per year in 1949.

Measuring returns of education to society is an even more complex problem. Some returns are vital and yet unmeasurable; in order to preserve and operate our social and political structure, general education is necessary. However, some way of determining a rate of return is needed for optimal allocation of resources. It is important whether or not differences in relative earnings reflect differences in productivity. Even though relative earnings in our economy are subjected to the interaction of market forces, there are still reasons why earnings don't accurately reflect differences in marginal productivity. This connection between relative wages and marginal productivities is weakened to the extent that the wage structure is rigid because of unions, for example (the American Medical Association as well as the Teamsters!).

Again there is the problem of estimating costs. While data on direct costs, i.e., outlays for operation and maintenance of educational facilities are readily obtainable, there are also indirect costs to be measured. When an individual is considered, the idea of income foregone is fairly clear; however, income foregone for the total student population is a hazy concept. What would happen, say, if a large portion of the student body were shifted into the labor market? The incidence of unemployment has to be accounted for also.

In spite of these difficulties, some attempts have been made to quantify the rate of return to society. Becker in the study mentioned above found that the direct returns to education (9 percent) about equal the direct returns to business capital. Renshaw obtained a similar figure.

The direct returns approach to investment in education has been criticized for its neglect of the consumption aspect of education. Education can be considered a source of present and future pleasure – not only for the student but other members of society as well. (Notably, as the critics are eager to point out, in providing baby-sitting services for the hard-working mothers.) Schultz [35] has suggested that in calculating the national rate of return, the consumption component of educational costs should be identified first and then subtracted from total educational costs in order to arrive at a base level of costs on the investment portion of educational expenditure.

Financing

The Constitution deems that education is a state function; however, the methods of financing primary and secondary schools are fairly uniform. Property taxation is the major source of local support for public education (54 percent), while the state contributes about half of that amount.

Federal support was less than 6 percent of total receipts in 1957-58 [41]. Seymour Harris [19, 20] has been a strong critic of this aspect of education. He condemns property taxation as the basis of support because of wide differences in the wealth of communities and the unresponsiveness of property taxes to economic growth. Federal and state income taxes have received support as sources of funds for education; proponents claim that they tax the beneficiaries of education (most heavily at the period of peak earnings), reach indirect as well as direct benefits of education, and are responsive to economic growth.

The financing of higher education is more complicated even though it involves fewer institutions. They are supported by various combinations of fees, gifts, private grants and funds from all levels of government. While it is sometimes proposed that the student should pay the full cost of his college education, this has not been taken too seriously. Not only would this indenture the student for life, it would be an unfair distribution of costs among those who benefit. In 1958, student fees were only 25 percent of the income of institutions of higher learning [41]. Gifts and grants by foundations and business firms accounted for 9 percent. The Federal government is playing a greater role in financing higher education (20 percent in 1957-58) through four main channels: research funds from the various departments, education and training programs, direct aid to students, and grants and loans for construction [27]. The states, which contribute the highest percentage, have only begun to make comprehensive surveys of higher education. Burdened with demands for increased quantity, they have not been able to increase tax funds for maintenance of quality [28]. Even more than in elementary and secondary education, there is need for study of financing methods.

Miscellaneous

Manpower studies which deal with the development and allocation of human resources have emphasized the role of education. People are the major factor in an economy's growth and output and education develops their talent. The supply and demand of college students has received much attention. On the supply side, studies have shown that the probability of a student's attending college is strongly related to his ability, sex, and his parents' education and income [3]. These results, however, have been obtained from samples too small to support statistical analysis of several variables. One aspect brought out by the supply studies is the waste of human resources due to dropouts. Of 100 children in the fifth grade in 1950-51, an estimated 58 were graduated from high school in 1957-58 [41].

Volumes have been written on the demand for college graduates. In 1949, Harris [18] predicted that by 1960 there would be a surplus of college graduates, forcing many of them to accept lower status jobs. More recently, shortages have been predicted especially in the teaching and scientific professions [4, 40]. "Shortage" has been used in several different contexts: demand at current wages increases so that some jobs go unfilled, fewer of a particular type than there ought to be, or wages of a particular occupation are rising so that a given sum of money doesn't purchase as great a volume of their services as it used to. Eckaus [10] has attempted to measure the demand for the educated by estimating the amount of education required to operate the economy at its present level and comparing it with the education embodied in the labor force. Because of the confusion of terminology, the interrelations of these markets are still relatively obscure.

One of the characteristics of the American school system is its extreme decentralization. Platt [29] in a recent article wrote that in order to discuss efficient allocation of resources to education, it is first necessary to know through what channels the decisions are made. Although he did not elaborate, he did point out an important aspect not yet tackled. Several interesting questions can be raised. What are the limitations in the freedom of planning in publicly supported institutions? What is the relation between faculty participation in decision making in the higher institutions and the allocation of resources?

I found only one study in which some attempt was made to obtain a production function for education. Fouraker [12] considered administrative service, techniques, and knowledge as a function of administrative officers, professional personnel and scholars. Unfortunately, he made no effort to quantify the inputs or outputs.

Even though there is no lack, in numbers, of educational studies, there are still many unanswered questions. It is necessary to determine more precisely the relations between various inputs and the level of accomplishment and to discover the shares of economic resources used for education in the United States.

Statistical Data

The Office of Education has been the major source of data since its inception in 1867. It gathers data from state departments of education and from reports made directly to it by individual local units. The Biennial Survey of Education in the United States, the chief publication for 42 years, has recently been supplanted by a new annual series entitled Statistics of Education in the United States. While the Biennial Survey covered the major areas of education

(statistics of state, local, and higher education) in each issue, the new series comprises only a particular area of educational statistics for a school year; the areas covered may differ from year to year. The first in this series is a report on the public secondary schools for 1958-1959 and includes data on enrollment, pupil retention, staff, and effects of reorganization. In addition to this series, the Office conducts many other periodic surveys; from 1956 to 1958 more than 44,000 statistical reports were requested by its statistical units.

There are two other important sources of national educational statistics: the U.S. Census Bureau and the National Education Association. The research division of the NEA, which publishes monthly reports, has been particulary concerned with the supply and demand for teachers in higher education. The NEA has conducted detailed studies of salaries paid and salary practices in universities, colleges, and junior colleges, the distribution of staff members over the salary range, the distribution of new teachers among the fields of instruction, and their formal preparation.

State departments of education are often good sources of data. While a few states compile only a minimum amount of data, others, such as New York and California, have extensive programs for the collection and analysis of educational statistics. There are other state organizations which gather data; these are primarily teachers' groups which emphasize the collection of salary data.

At the local level, data is collected by boards of education but only a few of the larger school districts publish extensive reports. General social and economic statistics, which may be useful, are collected on all levels.

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